REMARKS/ARGUMENT

Claims 1-6 are pending in this application. Claims 1-6 stand rejected. By this Amendment, claims 1, 2, 4 and 5 have been amended. The amendments made to claims 1, 2, 4 and 5 do not alter the scope of these claims, nor have these amendments been made to define over the prior art. Rather, the amendments to claims 1, 2, 4 and 5 have been made to improve the form thereof. In light of the amendments and remarks set forth below, Applicant respectfully submits that each of the pending claims is in immediate condition for allowance.

Paragraph 2 of the Office Action rejects claims 1, 5 and 6 under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,692,015 ("Higashi") in view of U.S. Patent No. 5,375,146 ("Chalmers"). Applicant respectfully traverses this rejection.

To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify a reference or combine references to arrive at the claimed subject matter. The prior art references must also teach or suggest all the limitations of the claim in question. See, M.P.E.P. § 706.02(j). A reference can only be used for what it clearly discloses or suggests. See, In re Hummer, 113 U.S.P.Q. 66 (C.C.P.A. 1957); In re Stencel, 4 U.S.P.Q.2d 1071, 1073 (Fed. Cir. 1987). Here, the references, whether taken individually or in combination, do not disclose or suggest the invention claimed by the Applicant.

Among the limitations of claim 1 that is neither disclosed nor suggested in the cited prior art is an interpolation synchronous detection method "wherein synchronous detection of the information between the pilot symbols contained in a received signal is performed by linearly interpolating a transfer function estimated from the pilot symbols."

The Office Action states that Higashi discloses a coherent detection method and system including a step of estimating a transfer function using pilot signals that are located before and after the information signal. (Office Action at 2). As disclosed in Higashi, its transfer function estimator 24 estimates the transfer function of a propagation path by carrying out interpolation of a reference pilot signal of a known pattern which is fed from a pilot signal generator 25 and the pilot signals contained in the received signal. (Column 5, lines 32-36). Further, as shown in Figure 3, the transfer function estimator receives as its inputs the received pilot signal as well as the generated pilot signal. Thus, the interpolator does not interpolate a transfer function estimated from the "pilot symbols contained only in a received signal" as explicitly recited in Applicant's claim.

The Office Action included Chalmers not to cure the deficiency in Higashi discussed above but to disclose the shifting of the sampling point so that the synchronous detection is updated at the middle point between the pilot symbols. Unfortunately, Chalmers fails to cure the deficiency in Higashi discussed above. Thus, when taken alone or in combination, the cited references fail to disclose Applicant's claim 1.

With respect to claim 5, Higashi fails to teach a transfer control section for changing a transfer function of said transfer function changing section at the middle point between the pilot symbols contained in a received signal. The Office Action included Chalmers to cure the stated deficiency of changing the transfer function at the middle point between the pilot symbols. However, neither Higashi nor Chalmers discloses the insertion of pilot symbols contained in a received signal. As discussed above, Higashi, the primary reference, includes a pilot signal generator 25 that is used as part of the transfer function estimator.

In contrast, Applicant only utilizes the pilot symbols contained in a received signal. Thus, Higashi fails to disclose the radio communication system recited in Applicant's claim 5 and Chalmers fails to cure this deficiency.

Claim 6 depends from, and contain all the limitations of claim 5. This dependent claim also recites additional limitations which, in combination with the limitations of claim 5, are neither disclosed nor suggested by the cited references and is also believed to be directed towards the patentable subject matter. Thus, claim 6 should also be allowed.

Paragraph 3 of the Office Action rejects claims 2-4 under 35 U.S.C. § 103 as being unpatentable over Higashi in view of U.S. Patent No. 5,822,364 ("Yamada") further in view of Chalmers. Applicant respectfully traverses this rejection.

Among the limitations of independent claim 2 that are neither disclosed nor suggested by the cited art of reference is a system2

> in which a pilot symbol contained only in a received signal to allow interpolation synchronous detection on a received side wherein a transfer function of a transmission/reception circuit used in said radio communication system is changed stepwise, the transfer function of said transmission/reception circuit is changed at a middle point between the pilot symbols contained in a received signal respectively located before and after the information signal.

As discussed above, Higashi fails to disclose a transfer function based on the pilot symbols being contained in a received signal. Higashi utilizes a pilot signal generated locally by pilot signal generator 25. Further, the inclusion of Yamada fails to cure this deficiency discussed above. Yamada discloses a coherent detection scheme with interpolation using a pilot symbol frame structure. It should be noted that Yamada uses

two distinct pilot signals TR1 and TR2, not one individual pilot signal as explicitly recited in Applicant's claim. Thus, none of the cited references disclose the limitations included in Applicant's independent claim 2.

Claim 3 depends from, and contains all the limitations of claim 2. This dependent claim also recites additional limitations which, in combination with the limitations of claim 2, are neither disclosed nor suggested by the cited references and is also believed to be directed towards the patentable subject matter. Thus, claim 3 should also be allowed.

Among the limitations of independent claim 4 that are neither disclosed nor suggested by the cited art of reference is a system

> in which a pilot symbol contained only in a received signal to allow interpolation synchronous detection on a received side wherein a transfer function of a transmission/reception circuit used in said radio communication system is changed stepwise, the transfer function of said transmission/reception circuit is changed at a middle point between the pilot symbols contained in a received signal respectively located before and after the information signal.

As discussed above, Higashi fails to disclose a transfer function based on the pilot symbols being contained in a received signal. Higashi utilizes a pilot signal generated locally by pilot signal generator 25. Further, the inclusion of Yamada fails to cure the deficiency discussed above. Yamada discloses a coherent detection scheme with interpolation using a pilot symbol frame structure. It should be noted that Yamada uses two distinct pilot signals TR1 and TR2, not one individual pilot signal as explicitly recited in Applicant's claim. Thus, the cited references fail to disclose Applicant's independent claim 4.

Applicant has responded to all of the rejections and objections recited in the Office reconsideration and Notice of Allowance for all of the pending claims is therefore respectfully requested.

The amendments to the claims are for clarification purposes only and are not intended to limit the scope of the claims in any way. It is asserted that the present amendment places the application in a form for allowance. Entry of this amendment is therefore earnestly solicited.

If the Examiner believes an interview would be of assistance, the Examiner is welcome to contact the undersigned at the number listed below.

Dated: January 24, 2003

Respectfully submitted,

By_____
Ian R. Blum
Registration No.: 42,336
DICKSTEIN SHAPIRO MORIN &
OSHINSKY LLP
1177 Avenue of the Americas - 41st Floor
New York, New York 10036-2714
(212) 835-1400
Attorneys for Applicant

IRB/mgs

APPENDIX B
Version With Markings To Show Changes Made
37 CFR 1.121(b)(iii) AND (c)(ii)

CLAIMS (with indication of amended or new):

1. (Amended) An interpolation synchronous detection method in a radio communication system in which a pilot symbol whose phase point is known is periodically inserted in an information signal to allow interpolation synchronous detection on a receiving side, comprising:

[wherein] synchronous detection of the information between the pilot symbols, contained only in a received signal, [is performed] by linearly interpolating a transfer function estimated from the pilot symbols respectively located before and after the information signal, and a reception sampling point timing used for the synchronous detection is updated at a middle point between the pilot symbols respectively located before and after the information signal.

2. (Amended) An interpolation synchronous detection method in a radio communication system in which a pilot symbol, contained in a received signal, whose phase point is known is periodically inserted in an information signal to allow interpolation synchronous detection on a receiving side, comprising:

using a transfer function wherein when [a] said transfer function of a transmission/reception circuit used in said radio communication system is changed stepwise, the transfer function of said transmission/reception circuit is changed at a middle point between the pilot symbols, contained only in the received signal, respectively located before and after the information signal.

4. (Amended) A radio communication system in which pilot [systems] symbols whose phase points are known are periodically inserted in two ends of an information signal having predetermined bits to allow interpolation synchronous detection on a receiving side, comprising:

interpolation means for performing synchronous detection of the information signal between the pilot symbols, contained only in a received signal, by linearly interpolating a transfer function estimated from the pilot symbols respectively located before and after the information signal on the receiving side;

means for performing interpolation synchronous detection by using a complex conjugate of the linearly interpolated transfer function; and

processing means for selecting a sampling point, at a middle point between the pilot symbols, at which an eye pattern opens most from a result obtained by discretely oversampling the reception signal, thereby demodulating the reception signal.

5. (Amended) A radio communication system in which pilot [systems] symbols, contained only in a received signal, whose phase points are known are periodically inserted in two ends of an information signal having predetermined bits to allow interpolation synchronous detection on a receiving side, comprising:

a transfer function changing section for changing a transfer function of a transmission/reception section in said radio communication system stepwise; and

a transfer function control section for changing a transfer function of said transfer function changing section at a middle point between the pilot symbols, contained in the received signal.

7. (New) A radio communication system in which pilot symbols whose phase points are known are periodically inserted in two ends of an information signal having predetermined bits to allow interpolation synchronous detection on a receiving side, comprising:

an interpolator performing synchronous detection of the information signal between the pilot symbols, contained in a received signal, by linearly interpolating a transfer function estimated from the pilot symbols respectively located before and after the information signal on the receiving side;

an interpolator performing synchronous detection by using a complex conjugate of the linearly interpolated transfer function; and

a processor for selecting a sampling point, at a middle point between the pilot symbols, at which an eye pattern opens most from a result obtained by discretely oversampling the reception signal, thereby demodulating the reception signal.

APPENDIX C
"Clean" Version Without Amended/New Indications
37 CFR 1.121(c)(3)

1. An interpolation synchronous detection method in a radio communication system in which a pilot symbol whose phase point is known is periodically inserted in an information signal to allow interpolation synchronous detection on a receiving side, comprising:

synchronous detection of the information between the pilot symbols, contained only in a received signal, by linearly interpolating a transfer function estimated from the pilot symbols respectively located before and after the information signal, and a reception sampling point timing used for the synchronous detection is updated at a middle point between the pilot symbols respectively located before and after the information signal.

2. An interpolation synchronous detection method in a radio communication system in which a pilot symbol, contained in a received signal, whose phase point is known is periodically inserted in an information signal to allow interpolation synchronous detection on a receiving side, comprising:

using a transfer function wherein when said transfer function of a transmission/reception circuit used in said radio communication system is changed stepwise, the transfer function of said transmission/reception circuit is changed at a middle point between the pilot symbols, contained only in the received signal, respectively located before and after the information signal.

3. A method according to claim 2, wherein the transfer function is changed stepwise by switching a gain range of a transmission/reception section used in said radio communication system.

4. A radio communication system in which pilot symbols whose phase points are known are periodically inserted in two ends of an information signal having predetermined bits to allow interpolation synchronous detection on a receiving side, comprising:

interpolation means for performing synchronous detection of the information signal between the pilot symbols, contained only in a received signal, by linearly interpolating a transfer function estimated from the pilot symbols respectively located before and after the information signal on the receiving side;

means for performing interpolation synchronous detection by using a complex conjugate of the linearly interpolated transfer function; and

processing means for selecting a sampling point, at a middle point between the pilot symbols, at which an eye pattern opens most from a result obtained by discretely oversampling the reception signal, thereby demodulating the reception signal.

5. A radio communication system in which pilot symbols, contained only in a received signal, whose phase points are known are periodically inserted in two ends of an information signal having predetermined bits to allow interpolation synchronous detection on a receiving side, comprising:

a transfer function changing section for changing a transfer function of a transmission/reception section in said radio communication system stepwise; and

a transfer function control section for changing a transfer function of said transfer function changing section at a middle point between the pilot symbols, contained in the received signal.

6. A system according to claim 5, wherein said transfer function changing section comprises a gain changing section capable of switching a variable gain range, and said transfer function control section comprises a gain control section.

7. A radio communication system in which pilot symbols whose phase points are known are periodically inserted in two ends of an information signal having predetermined bits to allow interpolation synchronous detection on a receiving side, comprising:

an interpolator performing synchronous detection of the information signal between the pilot symbols, contained in a received signal, by linearly interpolating a transfer

function estimated from the pilot symbols respectively located before and after the information signal on the receiving side;

an interpolator performing synchronous detection by using a complex conjugate of the linearly interpolated transfer function; and

a processor for selecting a sampling point, at a middle point between the pilot symbols, at which an eye pattern opens most from a result obtained by discretely oversampling the reception signal, thereby demodulating the reception signal.